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SOUTH-CENTRAL IOWA FROM COMPUTER ENHANCED
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LAND CLASSIFICATION OF SOUTH CENTRAL IOWA FROM COMPUTER ENHANCED IMAGES

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16. Abstract The Iowa Geological Survey Remote Sensing Laboratory (IGSRSL) with the Jet Propulsion Laboratory propose to develop land-use classification maps from computer enhanced LANDSAT imagery for portions of an eleven county area of south central Iowa. Three computer tapes for the project area have been identified and ordered from the EROS Data Center. Preliminary work has been initiated to determine the level and type of land-use classification which would satisfy the needs of county and state agencies engaged in land-use planning and management. In addition, available imagery at IGSRSL is being used to develop a working land-use classification system which may allow categorization based on reflectance characteristics. Administrative problems, which are currently being resolved, involve delays in data acquirement and voucher payment. Summary tables are included which indicate total funds allotted and total funds spent to date. It is recommended that a new principal investigator be named soon to alleviate procedural problems.			
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PREFACE

The primary objective of contract NAS5-20832 is to produce land-use classification maps of portions of an eleven county area in south-central Iowa. The Iowa Geological Survey Remote Sensing Laboratory in conjunction with the Jet Propulsion Laboratory (JPL), plan to develop computer enhanced satellite imagery to optimize extraction of land-use categories for this project area.

Two problem areas have been encountered: 1) Delays in data acquisition, and 2) Delays in voucher payments.

Three computer tapes showing early spring, late summer, and early fall have been identified and ordered from the EROS Data Center. County and state planning agencies have been contacted in order to assess their needs for planning projects. This interaction will be utilized at JPL to determine the most effective enhancement techniques for southern Iowa.

Summary tables are included for funds expended as well as for monies spent for data acquisition.

The paramount recommendation is that a new principal investigator be appointed as soon as possible.

Introduction

The Iowa Geological Survey Remote Sensing Laboratory (IGSRSL) has been using conventional LANDSAT-1 imagery for mapping materials, landforms, and land use of an eleven county area in south-central Iowa. By applying existing Jet Propulsion Laboratory (JPL) digital processing techniques to computer compatible tapes (CCT's) of LANDSAT multispectral scanner imagery, IGSRSL and JPL propose to develop enhanced images which would be applicable to regional land-use classification and planning for an area in southern Iowa. Computer enhanced single-band and multiband products derived from digital tapes will be used to produce color-thematic maps of the land classification. Feedback from processing results will be employed to select and refine the digital enhancement techniques to optimize the extraction of land-use categories.

Three computer tapes for the project area have been identified and ordered from the EROS Data Center (EDC). A literature search and experience with visual interpretations are being used to determine a land-use classification which would satisfy the needs of county and state agencies engaged in land-use planning and management. Available imagery at IGSRSL, which includes LANDSAT, Skylab, and NASA high altitude, are being used to develop a working land-use classification system for the area. This preliminary system may allow land-use categories to be assigned based on reflectance characteristics. Various processing programs for image enhancement will be attempted to categorize Iowa's unique landscape.

Problems

Two specific problem areas have been identified. They are:
I. Delays in data acquisition, and II. Delays in voucher payments.

I. Delays in Data Acquisition

The two changes in principal investigator as well as the delay in the signing of the "Memo of Understanding" between EDC and the National Aeronautics and Space Administration/Goddard Space Flight Center (NASA/GSFC) have caused delays in ordering LANDSAT materials. The funds which have been allocated for the purchase of imagery and CCT's are available only to the principal investigator. With the resignation of Dr. Samuel J. Tuthill as State Geologist, this NASA contract no longer has a principal investigator. This in essence has caused the allotted funds for CCT's and imagery at EDC to be "frozen" pending the appointment of a new principal investigator. This situation coupled with a four-to-eight week delay in receiving CCT's after an order has been processed at EDC, and the fact that the funds allotted in the contract will support the project manager for only sixteen months could have threatened the most complete realization of this contract. For these reasons, the project manager deemed it necessary to order two CCT's on Iowa Geological Survey money to ensure the continued progress of the contract. Because of this action, IGSRL will be able to start image enhancement processing at JPL as early as June 1, 1975.

II. Delays in Voucher Processing

The slowness in the processing of vouchered charges caused the Iowa State Comptroller's office to become concerned. This concern was caused by an approximate two month delay in payment of charges after the first submittal of vouchers. This delay actually forced the Comptroller's office to "loan" monies to the IGSRL in order that the NASA contract could continue uninterrupted. The problem seems to have been alleviated with the arrival of the monies for the first two months of operating expenses. We expect that in the future the voucher payments will not be delayed.

Accomplishments

I. Three CCT's for the project area have been identified and ordered from available LANDSAT-1 imagery. The specific temporal views from these scenes will be early spring, late summer, and early fall. The dates, identification numbers, band quality, and percent cloud cover for these tapes are as follows:

Date of Tape	Identification Number	Band Quality (Band)				Percent Cloud Cover
		#4	#5	#6	#7	
15 Apr. 1974	8 1631 16161 5 NO	8	8	8	8	Less than 10
29 Aug. 1972	8 1037 16213 5 NO	8	8	8	8	0
24 Sept. 1974	8 1793 16105 5 NO	8	8	8	8	20

II. Several regional planners within the State of Iowa have been contacted in order to assess their immediate needs for planning projects. This interaction has led to the initiation of a

working land-use classification system based primarily on 1:250,000 scale, 30" by 30" color-composite enlargements of LANDSAT-1 imagery. This preliminary mapping, limited to summer scenes, may allow for the assignment of image density levels to specific land use, based on reflectance characteristics from earth materials.

In addition, the IGSRL is planning a series of short courses this summer for regional planners in the State of Iowa. Not only will this give the planners a chance to view our facilities in remote sensing, but it will also give them an opportunity to contribute their views on how remotely sensed data may be used to help solve their planning problems.

III. Arrangements for a trip to JPL for CCT image processing has been planned for early June. Prior to the trip to Pasadena, the CCT's will be checked on the EDC's IMAGE 100 system to ensure that the correct tapes have been acquired as well as checking for the overall band quality. If the tapes prove to be satisfactory, they will be sent to JPL for preprocessing before J.R. Lucas and J.V. Taranik travel to Pasadena to continue work on digital enhancement techniques.

IV. A literature search has been initiated to aid in refining our working land-use classification system as well as the selection of appropriate techniques for image enhancement which may be unique to this particular area of the Midwest.

Funds Expended

Table I summarizes the total funding by NASA for both IGSRL and JPL. The total funds expended by IGSRL for the first quarter are \$3,322.31, as shown in Table II. The IGSRL has been reimbursed \$2,023.86 by the government for incurred expenses during the first two months, as Table II indicates.

Data Use

The delay in the signing of the "Memo of Understanding" between EDC and NASA/GSFC, and the changes in the principal investigator have caused delays in ordering imagery and CCT's from our EDC accounts. However, two CCT's have been ordered on Iowa Geological Survey money; one CCT order has been placed using the EDC account. The IGSRL CCT orders have been processed resulting in the arrival of one CCT with the other expected within the week. The CCT which was ordered on account No. B0660 has not been processed at EDC because the project manager was not aware that only the principal investigator is authorized to order imagery and computer tapes on allocated funds. Since Dr. Samuel J. Tuthill is no longer director of the Iowa Geological Survey and is therefore no longer principal investigator, there is a "hold" on EDC funds until a new principal investigator is named. Data acquisition from the EDC is summarized in Table III.

Recommendations

It is recommended that a new principal investigator be appointed as soon as possible. This action would alleviate the problems being

TABLE I

Summary Table for Funding by NASA

Total Funding by NASA to the
Iowa Geological Survey Remote Sensing Laboratory

Salary for Project Manager Based on 16 Months	\$16,874.00
Employee Benefits for Project Manager	2,038.00
Travel Related to Project	
Transportation	2,400.00
Per Diem	1,600.00
Expendable Materials and Photographic Supplies . .	863.00
Publication Expense.	5,000.00
Subtotal	<u>28,775.00</u>

Total Funding to JPL by NASA

Salary for JPL Scientific and Technical Staff and Computer Processing Time.	20,000.00
Total Funding by NASA for Contract NAS5-20832. . .	<u>\$48,775.00</u>

TABLE II

Summary Table for Total Funds Expended

Land Classification of South-Central Iowa from
Computer Enhanced Images

Contract: NAS5-20832

Contractor:

Iowa Remote Sensing Laboratory
Iowa Geological Survey
16 West Jefferson Street
Iowa City, Iowa 52240

Total Expenditures for February 3, 1975 to May 3, 1975

<u>Element of Cost</u>	<u>Total Expenditures to Date</u>
Salary for Project Manager Based on 16 Months.	\$2,680.00
Employee Benefits	
FICA	156.80
IPERS.	37.52
Blue Cross	108.00
State Life Insurance	3.00
Expendable Materials and Photographic Supplies	176.34
Travel Related to Project	160.65
Total Reimbursable	<u>\$3,322.31</u>
Total Payments Received from Government	\$2,023.86
Expenses Incurred by IGSRL during April	1,298.45

TABLE III

Data Acquisition for Contract NAS5-20832
Under Funds Allotted to the EROS Data Center by NASA

	<u>Value of Data Allowed</u>	<u>Value of Data Ordered</u>	<u>Value of Data Received</u>
CCT Account No. B0660	\$1,000.00	\$200.00	-----
LANDSAT Imagery Account No. 20660	100.00	-----	-----

experienced in data acquisition. It would also lend continuity to administrative tasks involved in executing contract requirements.